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REMARKS OF

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NATIONAL AERONAUTICS and SPACE ADMINISTRATION
WASHINGTON, D. C.

before
THE ENGINEERING LUNCHEON

NATional Association of Broadcasters
Golden Anniversary Convention
Conrad Hilton
Chicago, Illinois

April 11, 1972

NAB Engineers' Luncheon

April 11, 1972

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that space scientists have been
interfacing with broadcast engineers
for quite a few years

Introduction

~~Still giving our executives great
difficulty in keeping up with
the most recent technical advances
we create~~

(Start with conversation with Earl J. Glade of KSL in 1958.)

It's a pleasure to be here. It seems that space scientists have been interfacing with broadcast engineers for quite a few years.

~~Let me remind you that~~ we are the activists in a communications revolution. We are the movers and shakers in a drastic change in the technology of communications, the effects of which are only beginning to be felt. Even though this new technology is still in its infancy, we can forecast with certainty that its impact will change our lives -- and our living -- most profoundly. It is inevitable that the pattern of our personal and professional activities will be altered in major ways.

All of you probably have a more intimate knowledge than I of what the emerging technology means to the commercial field as we now know it. But you may be less familiar with the forcing role that the great flood of data accumulated from space is going to play on existing surface communications nets. This is information on a variety of mundane activities -- urban planning, agriculture, land use, weather, earth resources, and like matters.

The shelf life of much of it is very short. It must quickly be processed, reduced, and relayed to end-users, often within a few hours if it is to be of any value. To say that its sheer volume and the requirement for fast transmission is straining present facilities is a bit understated. They are more than saturated.

(~~Conversation with Tom O'Neill~~ in 1961 on stereo tapes.)

Omit.

Our success in gathering information from space is forcing a revamping of surface communications as they relate to data transmission, and a substantial upgrading of the capacity of the system's components.

The echoes of our revolutions will be heard in many sectors. Identifying all of them would take an imagination even more fertile than that of science fiction writer Arthur Clarke -- who put forward the idea of a communications satellite years before Sputnik. I do not intend to try. However, I can make one statement about the effects of our revolutions with complete confidence. They will be as beneficial as they will be far-reaching -- which is very far indeed.

With this the prospect, one would expect that this and related space efforts would find a broad base of public support. One might expect differences of opinion on program emphasis, program direction or even on the scale of the effort. They do indeed exist. But there is more. The space program has been encountering a determined and vocal opposition from a group that might reasonably be expected to be its staunch supporters. This is a classic irony, it seems to me, since with few exceptions humanists have only recently been joining the ranks of anti-technology and have become its most vocal opponents.

If one analyzes the position taken by these misguided individuals it becomes evident that they are victims of planned error. They begin with a set of invalid premises and, with inexorable logic, proceed to an erroneous conclusion. As humanists, they are profoundly aware -- as indeed we all are -- of the pressing problems of modern society. Unschooled in science or engineering, they make technology the villain in the piece, not unlike the Luddites of early 18th century England. Technology is the most obvious target since many of its impacts both positive and negative are easily visible. Of course, the most visible progenitor of technology is the space program.

Many of these misguided individuals, academicians, writers and some in the Congress of the U. S. actually make their living attacking technology and as such can be called professional anti-technologists. They seem to be riding a horse named relevancy. So let us key on this term and examine various aspects of NASA's activities in the light of relevancy. Let us begin right in our own backyard -- with the communications satellite. Because of it, distance has become insignificant. The ionosphere will no longer play its tricks on us. The multi-access spacecraft introduces a visual capability. A picture reaches us -- in real time -- from half a world away.

The Luddites were working people who went on violent sprees destroying all machinery ^{+ factories} as a threat to their future employment

The satellite has introduced a striking drop in operating costs. The domestic system that has been proposed -- if used to full capacity -- would enable us to complete a 3 minute coast-to-coast telephone call for one-half cent. Well, lets be more practical. We know that 100% use is unrealistic. So let us say that the system is used only to 25% capacity. The call would then cost two cents!

Is this relevant?

But we shouldn't stop there. The number of voice channels will continue to increase -- probably exponentially. On-board power will be progressively stepped up. Eventually we will have the equivalent of a giant switchboard in space which will not only handle with ease an enormous voice traffic, but will be able to telecast directly to conventional receivers anywhere within an area of roughly a million square miles. This is of real consequence to those areas which do not have established surface networks.

Medical consultations where an ocean separates the patient from the specialist will be routine. National sales meetings will be held without a single salesman having to move from his territory. Lecturers can address classes on dozens of campuses simultaneously. The effect on education, health and medicine, and marketing hardly needs underscoring.

How could we be more relevant?

There could be much more said, but I would like to turn to another area of activity which has opened up -- in part because of our new capability for data collection. NASA is placing increasing emphasis -- with solid Presidential and bi-partisan Congressional backing -- on developing those uses of space that will directly benefit man. This includes what we call the applications missions and the Earth Resources program.

You are all familiar with -- and use -- the weather satellite. I am sure you know of the more advanced experimental weather birds that we are flying. Our projection of the future also includes a space-borne navigation system which will materially improve air and sea safety, and help deal with a growing congestion on major air routes.

This year we are going to fly the first Earth Resources Technology satellite. This spacecraft is part of a broad program, which involves manned as well as unmanned missions, to provide us with a running inventory of conditions here on the Earth's surface, and what we are doing to our environment. Remote sensing from space, we have discovered, can tell us many things about our home planet.

Our agriculture will be a major beneficiary. We can tell from space which crops are where, whether they are healthy or diseased. The same is true for our timber lands. From the spacecraft we can learn the depth of the snow pack and from that, estimate the volume of the spring run-off. The satellite can also spot underground rivers. Mineral bearing geologic formations are revealed by satellite cameras -- oil, iron and copper for example.

These satellites will offer an assist to oceanographers. They show the sea state, can track sea ice, identify upwellings and delineate currents. They also record the interaction between sea and shoreline, and other events occurring in the area of the ~~littoral~~ *transitional region*. And quite recently, we have discovered that it is possible to detect oil slicks, which are often difficult to spot, by means of sensing devices. Finally, these eyes in orbit give us an overview of the origin, intensity and movement of pollutants in our waters and in our atmosphere, which is essential to an effective handling of the clean up of our air and water.

I mentioned that the Earth Resources program involved both manned and unmanned missions. Besides the instrumented ERTS, much of the study and experimentation planned for the Skylab flights will deal with this area. It is also likely that when the Space Shuttle becomes operational, it will be used in studies of the Earth's surface and the atmosphere.

Certainly these activities are relevant.

Should we have to ask the question about

... providing new pollution-free sources of energy?

... working to reduce the loss of life and property from natural disasters?

... the significant contributions of exobiologists to biomedical research?

... the development of a fast, safe and clean transportation system?

... and a quick, precise means of measuring the level of air pollution -- a prerequisite to the effective setting and enforcement of pollution standards?

I don't think so. Yet, as of today, April 11, 1972, NASA is active in all these areas -- and in many more as well.

To take a broader view -- beyond the immense potential of our Earth Resources Program and the substantial benefits already derived from the communications and weather satellites. Consider the vast amount of new knowledge regarding the Earth, the dynamics of its environment, its place in the solar system and its relationships with our master star, the Sun, that our work in space science has produced. Keep in mind, also, the results of our investigations of our planetary neighbors -- an effort which is only at its beginnings. Then to this add the important findings which have come from our manned program of lunar exploration.

The total is bewildering in volume and diversity. In my view it has few peers in its importance to mankind and his future. Relevancy? How much more relevant ~~can you get~~ *is it possible to be?*

pg 7 In disputing the anti-technologists, I won't take issue with their goals. Clean air and water, viable inner cities, a nutritious diet and adequate shelter for all people are musts if we are to survive -- let alone prosper. But I will oppose vigorously the way they propose to achieve these goals.

In brief, they argue that if the space program is done away with, the problems that are rooted in technological advance will disappear as well....and there will be a bonus: the funds now allocated to space can be applied to poverty, aid to the inner city and to other national needs.

Nonsense! In so arguing, the base for planned error has been laid. A fundamentally irrational position has been taken. Critics of this stripe are unable or unwilling to recognize that technology is a tool -- and nothing more. They fail to realize that the adverse effects of its employment -- such as fouled air and water -- can in no way be attributed to the tool. In a sense, this attack is akin to the carping about the violence in some TV programs. The telecasters are blamed -- and the technology -- instead of the viewers who create the demand for programs of this kind. The blame rests unequivocally on the society that abuses or misapplies the tool. Proponents of this kind of astigmatic reasoning promptly conclude that the remedy is the elimination of technology, and your problems will automatically be solved.

Beyond the more straightforward difficulties that opposition of this kind presents, there are others that are more serious. It is a melancholy fact that often those engaging in such planned error are persons whose intellectual achievements in fields unrelated to science and technology has earned for them positions of leadership. With them in opposition, the space program is deprived of the support of a leadership element that should, by rights, be a constructive participant in the decision making process. Additionally, NASA is deprived of a bridge between the technically oriented and a substantial segment of the public which is neither scientifically nor technologically minded.

The late Dr. Lloyd Berkner in his book The Scientific Age described what is at stake. He wrote:

"Having embarked as a nation on the course of federal support of science and technology, out of which an economy of plenty has been derived, the future stability of that economy rests unambiguously on the wisdom of the policies that will govern the future of federal support."

If Dr. Berkner was right, and I believe he was, we face a communications problem of no small dimensions. We have become a high-technology economy. From this there is no turning back -- despite the yearnings that many of the humanists display for a return to a more primitive and less technological society. If we are going to maintain the stable economy that will provide us with the tax base to support the vigorous social programs that are now needed, we will need more technology rather than less. One economist said recently that already over \$50 billion has been added to the economy by the Apollo program alone and in the next 10 years ~~as much as \$150 billion!~~ ^{100 Billion more} That could make a dent in some of our social difficulties but even then, not without appropriate application of new technology. If we are going to untangle our transportation mess, develop vehicles that do not pollute, overhaul our inner cities, and clean our waterways, we must have more technology and more higher-technology -- and then take strong measures to prevent its being misapplied.

The question, then, is how can the anti-technologist be persuaded of these fundamental truths?

If his was a position rationally arrived at, he might be influenced by reasoned argument. However, our experience provides little reason to think that this approach would be effective. This is an age of non-rationality ^{or even ir-rationality} among the humanists and many of our young. It is more likely that these can only be brought to accept high technology as an essential instrument in resolving our problems by demonstrating that it works.

In this task, the Presidential directive that the major thrust of federally-supported research and development be directed at urgent domestic needs is an important step. For NASA, emphasis in the coming years will be placed on studies of this planet and its environment from low-earth orbit. As I have noted, the potential of this program, as it can now be identified, is immense. And it has been our experience that advance estimates of this kind are shown to have been conservative when all the results were in.

I am confident that, as our program moves ahead, we will be able to confront the anti-technologist with a sequence of ^{p2.10} results from our space work. These will be results that have a direct impact on the solving of some of the social problems that concern him -- and the rest of us.

While this erosion of the position of the anti-technologist is in process, it is important that we take every precaution that his ^{campaign} ~~efforts~~ ^{does} ~~do~~ not impede the formation of the wise policies of federal support to which Dr. Berkner referred. Our immediate future depends on it, our long range future will be determined by it.

Vol. 3#5 May 15, 1972

**DR. FLETCHER SPEAKS TO NAB
ON SPACE PROGRAM RELEVANCY***Cites Communications Revolution and Refers
to Anti-Technologists as "Victims
of Planned Error"*

Striking out at anti-technologists as "misguided individuals," Dr. James C. Fletcher, NASA Administrator, told an engineers' luncheon of the National Association of Broadcasters in Chicago on April 11 that the communications revolution brought about by the space program will alter in major ways "the pattern of our personal and professional activities."

Here are excerpts from his remarks:

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"Our success in gathering information from space is forcing a revamping of surface communications as they relate to data transmission, and a substantial upgrading of the capacity of the system's components.

"The echoes of our revolutions will be heard in many sectors. Identifying all of them would take an imagination even more fertile than that of science fiction writer Arthur Clarke—who put forward the idea of a communications satellite years before Sputnik. I do not intend to try. However, I can make one statement about the effects of our revolutions with complete confidence. They will be as beneficial as they will be far-reaching.

"With this the prospect, one would expect that this and related space efforts would find a broad base of public support. One might expect differences of opinion on program emphasis, program direction, or even on the scale of the effort. They do indeed exist. But there is more. The space program has been encountering a determined and vocal opposition from a group that might reasonably be expected to be its staunch supporters. This is a classic irony, it seems to me, since with few exceptions humanists have only recently been joining the ranks of anti-technology and have become its most vocal opponents.

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Horse Named Relevancy

"Many of these misguided individuals, academicians, writers and some in the Congress of the U.S., actually make their living attacking technology and as such can be called professional anti-technologists. They seem to be riding a horse named Relevancy. So let us key in on this term and examine various aspects of NASA's activities in the light of relevancy. Let us begin right in our own backyard—with the communications satellite. Because of it, distance has become insignificant. The ionosphere will no longer play its tricks on us. The multi-access spacecraft introduces visual capability. A picture reaches us—in real time—from half a world away.

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"How could we be *more* relevant?"

Emphasis on Benefits

"There could be much more said, but I would like to turn to another area of activity which has opened up—in part because of our new capability for data collection. NASA is placing increasing emphasis—with solid Presidential and bi-partisan Congressional backing—on developing those uses of space that will directly benefit man. This includes what we call the applications missions and the Earth Resources Program.

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Oceanographers Will Benefit

"These satellites will offer an assist to oceanographers. They show the sea state, can track sea ice, identify upwellings and delineate currents. They also record the interaction between sea and shoreline, and other events occurring in the area of the transitional region. And quite recently we have discovered that it is possible to detect oil slicks, which are often difficult to spot, by means of sensing devices. Finally, these eyes in orbit give us an overview of the origin, intensity and movement of pollutants in our waters and in our atmosphere, which is essential to an

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No Issue with Goals

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More Technology Needed

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NIXON WRITES PETRONE

Dr. Rocco A. Petrone, Director of the Apollo Program in the Office of Manned Space Flight, has received the following letter from President Nixon:

"As we approach the final countdown for Apollo 16, I want you and all the men and women of Apollo to know how much this nation values your splendid efforts. The Moon flight program has captured the imagination of our times as has no other human endeavor. You and your team have, in fact, written the first chapter in the history of man's exploration of space, and all future achievements must credit all of you for having blazed the path.

"Countless people throughout the world will soon be sharing with you the excitement of Apollo 16's voyage, and I know I speak for all of them in conveying to you my warmest best wishes for a safe and successful flight. Good luck!"